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SOME EXCITATION FUNCTIONS OF ALPHAS AND DEUTERONS ON BISMUTH

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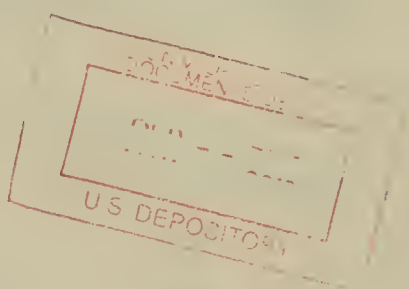

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As a part of a systematic investigation of excitation functions, the absolute cross sections for the reactions (α,2n), (α,3n), (d,p), (d,n), and (d,3n) on bismuth will be presented. See graphs. The technique used is the usual one of bombarding stacked foils, with some improvement of the definition of energy and measurement of current. The improvements consisted of a collimating slit system that produced a beam of 2 per cent straggling or less, and a means of continuously recording the beam current during bombardment of the stack of foils. The (α,3n) reaction on Bi leading to the formation of At^{210} has been identified. At^{210} has a half-life of 8.3 hr, decaying by K-capture to Po^{210}, accompanied by emission of 1.0-Mev gamma rays. Branching decay of At^{210} by alpha emission is less than 1 per cent, if it exists.

The integrated mass stopping power of Bi, Cu, Ag, Ta, Tl, and U have been redetermined with respect to Al, using 36-Mev alphas. The tabulated results are listed in Table 1.

The unexpected rise of the (d,n) cross section above 13 Mev is taken to indicate the presence of the (d,2n) reaction. An attempt will be made to disentangle the (d,2n) cross section and identify the resulting product.

Table 1.

Substance	Energy range	Integrated mass stopping power relative to aluminum
Cu	36–28	0.801
Cu	27–15	0.781
Ag	36–28	0.671
Ag	27–15	0.650
Ta	36–28	0.548
Ta	27–15	0.516
Bi	36–6	0.488
Th	36–28	0.505
Th	27–15	0.477
U	36–28	0.487
U	27–15	0.472

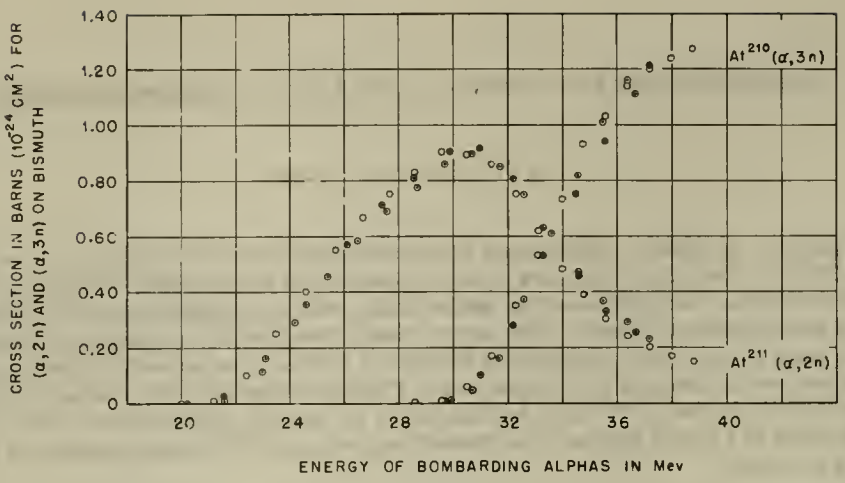

Figure 1

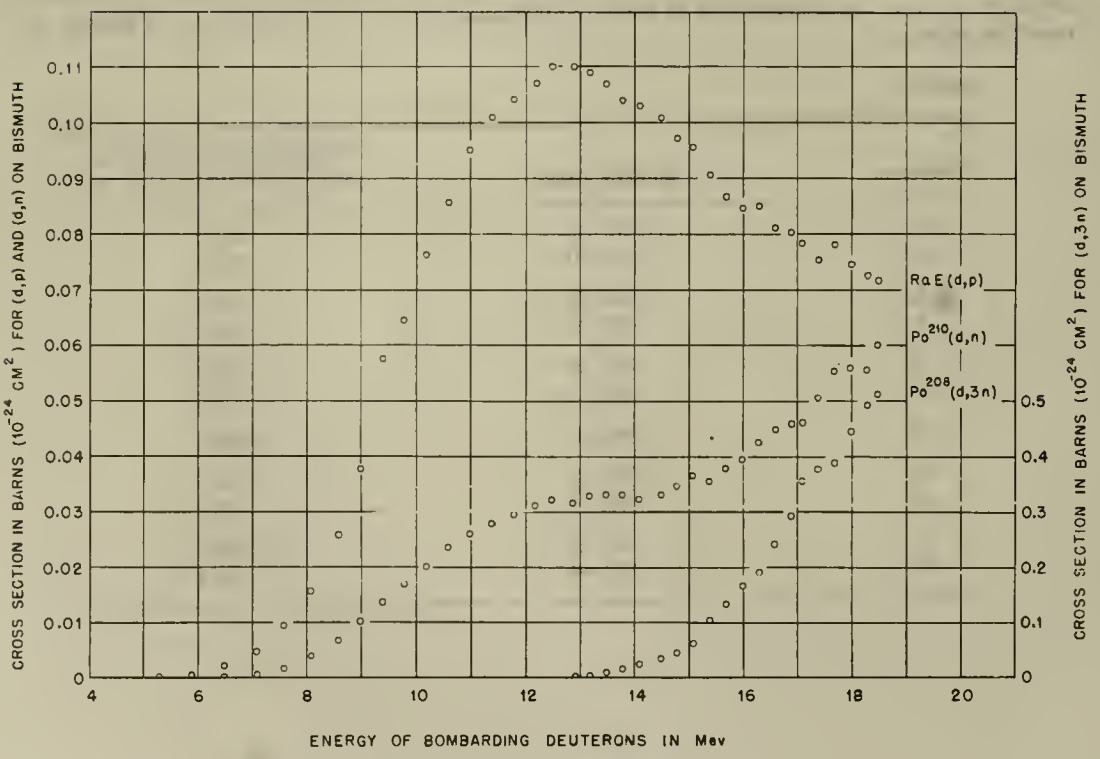

Figure 2